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them to discover if these bunches might correspond in any way with the "root tubercles" of recent plants. As only one such case has been recorded from the Coal Measures, the result is of special interest. These lateral roots are found to have a thick cortex divisible into two regions, the inner of which contains dark cells that show evident fungal hyphae. The fungus occurs in knots of non-septate hyphae that bear sometimes terminal vesicles, but there was no trace of any spore-formation. The conclusion is reached that "Cordaitea was probably a tree inhabiting saline swamps, and having bunches of coralline rootlets on its roots, such as are known to occur in many recent plants growing under similar conditions."—J. M. C.

Anatomy of Equisetum.—EAMES³⁶ has discovered that although the xylem of Equisetum is centrifugal throughout the vegetative stem, it is also centripetal in the axial bundles of the strobilus and of the sporophylls; in the former the bundles are "weakly mesarch," in the latter "strongly so." This suggests that the most primitive representatives of Equisetales had well-developed centripetal wood, and connects them with such ancient forms as Sphenophyllales, already suggested by SCOTT's discovery of centripetal wood in a calamite. All the large groups of pteridophytes are now known to possess centripetal wood, so that "such bundles in higher plants can be of no other phylogenetic value than as indicating general cryptogamic affinities." At the same time, Equisetum confirms the value of the leaf gap as a phylogenetic character, since in no case does the passage of a leaf trace from the stele leave a gap.—J. M. C.

Protection against light.—MARLOTH describes some very remarkable ways in which a few African desert plants reduce the amount of light which the green tissues of their leaves receive.³⁷ He refers to three categories: (1) plants with fleshy and green leaves, having membranous stipules which extend beyond and conceal them; (2) plants with fleshy and green leaves, without stipules, but invested by the dried-up remnants of the older leaves; (3) plants with windowed leaves. This most curious arrangement is characteristic of plants with very fleshy leaves whose blunt, plane, or erose tips alone reach the surface of the soil, the body of the leaf being completely buried. This exposed tip lacks chlorophyll, and through this as through a window the light reaches the green tissue, which is restricted to the sides of the fat leaf. Several species of Mesembryanthemum have this peculiarity.—C. R. B.

"Transpiration" in aquatics.—Under a similar misleading title THODAY and SYKES³⁸ present a brief account of a few experiments that show movement of

³⁶ EAMES, ARTHUR J., On the occurrence of centripetal xylem in Equisetum. *Annals of Botany* 23: 587-601. *pl.* 45. 1909.

³⁷ MARLOTH, R., Die Schutzmittel der Pflanzen gegen übermässige Insolation. *Ber. Deutsch. Bot. Gesells.* 27: 362-371. *figs.* 2. 1909.

³⁸ THODAY, D., AND SYKES, M. G., Preliminary observations on the transpiration current in submerged water-plants. *Annals of Botany* 23: 635-637. 1909.

water through the stems of submerged aquatics. To call such a stream "the transpiration current" is manifestly absurd, unless one changes the meaning of the word transpiration. It will be remembered that others have found evidence of like movements, so that these new experiments only add somewhat clearer evidence as to its existence, which the most elementary consideration of the physical conditions would lead one to expect. Yet these authors naively say: "Probably external conditions also affect the results; this point we hope to investigate later." This really is the fundamental point: does not the heating of the leaves create the conditions for the circulation of water as truly in this case as in a house heating system?—C. R. B.

Fixation of free nitrogen.—POLLACCI reports in a preliminary note³⁹ that in a large number of experiments he has demonstrated the fixation of free nitrogen in such plants as lichen, salvinia, azolla, fern prothallia, and duckweed. The increase of total N in a few cases cited amounts to 33–67 per cent. The full paper will be awaited with interest. POLLACCI has a heavy weight of adverse evidence to counterbalance. He indicates that the contradictory results of the earlier observers, e. g., BOUSSINGAULT and VILLE, were probably due to differences in the capacity of different plants for this fixation. It is to be remembered, however, that all the recent evidence under improved chemical methods is adverse to the idea that ordinary plants are able to utilize N₂.—C. R. B.

Prothallium and embryo of Danaea.—CAMPBELL⁴⁰ has made a preliminary investigation of the prothallium and embryo in several species of Danaea secured in Jamaica. The archegonia are remarkable for the imperfect development of the ventral canal cell, which in many cases could not be demonstrated at all. The fertilized egg becomes elongated in the direction of the axis of the archegonium before the first division. The hypobasal cell does not divide or there is a single division, resulting in a short suspensor, all of the regions of the embryo arising from the epibasal cell. This cell gives rise to somewhat irregular quadrants, the two lower ones forming the foot, and the two upper giving rise to stem tip and leaf, and later to the root.—J. M. C.

Chromosomes of Hyacinthus.—Miss HYDE⁴¹ finds that in Hyacinthus in the prophase of the heterotypic mitosis the spirem twists into 8 loops which become 8 chromosomes. The loops break apart at the center so as to form 8 bivalent chromosomes. When fully formed, the chromosomes show a striking difference in size, 4 being comparatively large, 3 small, and the remaining one intermediate.

³⁹ POLLACCI, G., Ricerche sull' assimilazione dell' azoto atmosferico nei vegetali. Atti Ist. Bot. Univ. Pavia II. 13:351–354. 1909.

⁴⁰ CAMPBELL, D. H., The prothallium and embryo of Danaea. Preliminary note. Annals of Botany 23:691. 1909.

⁴¹ HYDE, EDITH, The reduction division in the anthers of *Hyacinthus orientalis* Ohio Naturalist 9:539–544. pl. 32. 1909.